News from the CNGS extraction problem

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in collaboration with

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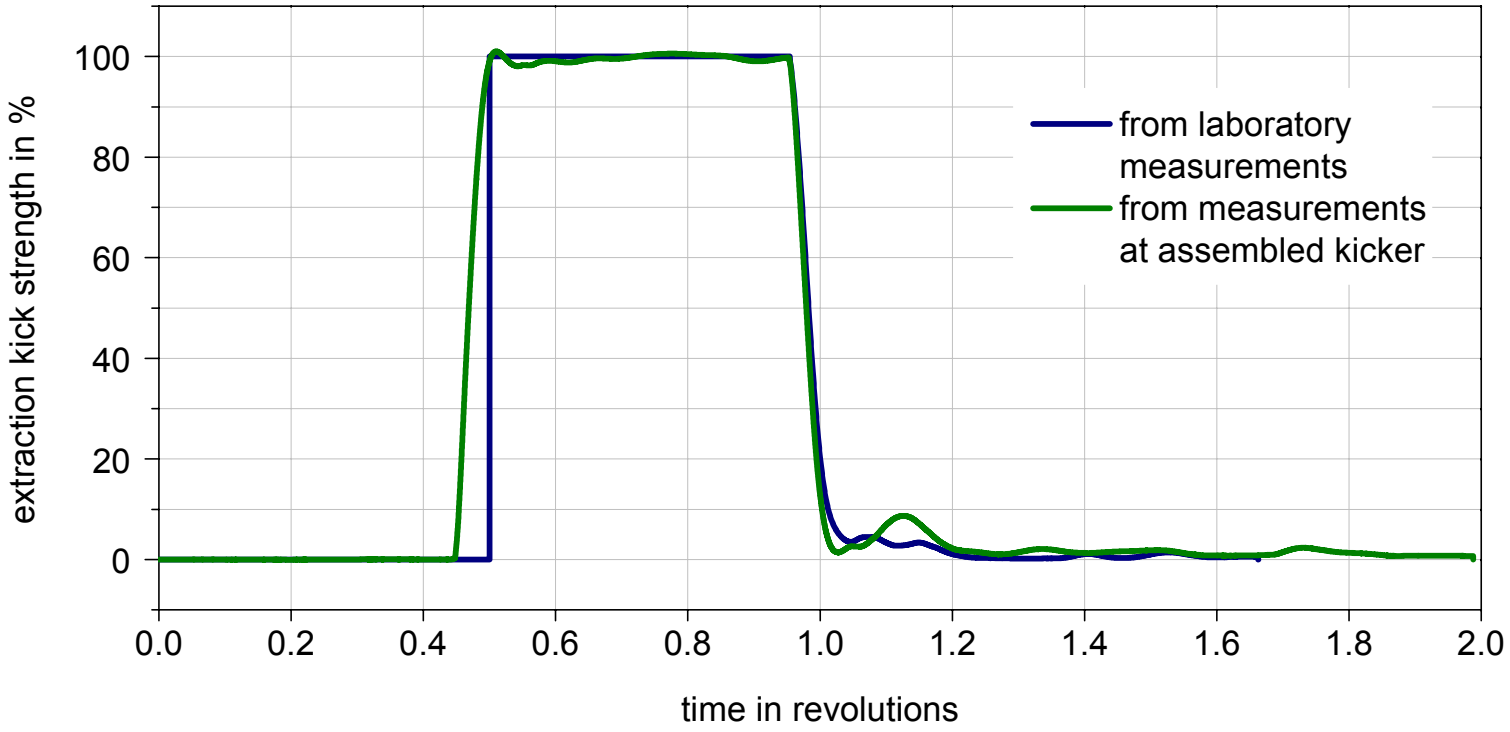
LCE Section Meeting

Short recall …

- CNGS beam in the SPS consist of two batches of 2100 bunches with gaps of 210 positions
- extraction to CNGS target in two steps, producing neutrinos propagating towards Gran Sasso
- tight constraints to hit the target properly
- 2167 turns between both extractions
- extraction of first batch excites second batch due to remaining kicker ripple
- second batch will perform large betatron oscillations
- Question: **Can we damp down these oscillations within 2167 turns?**

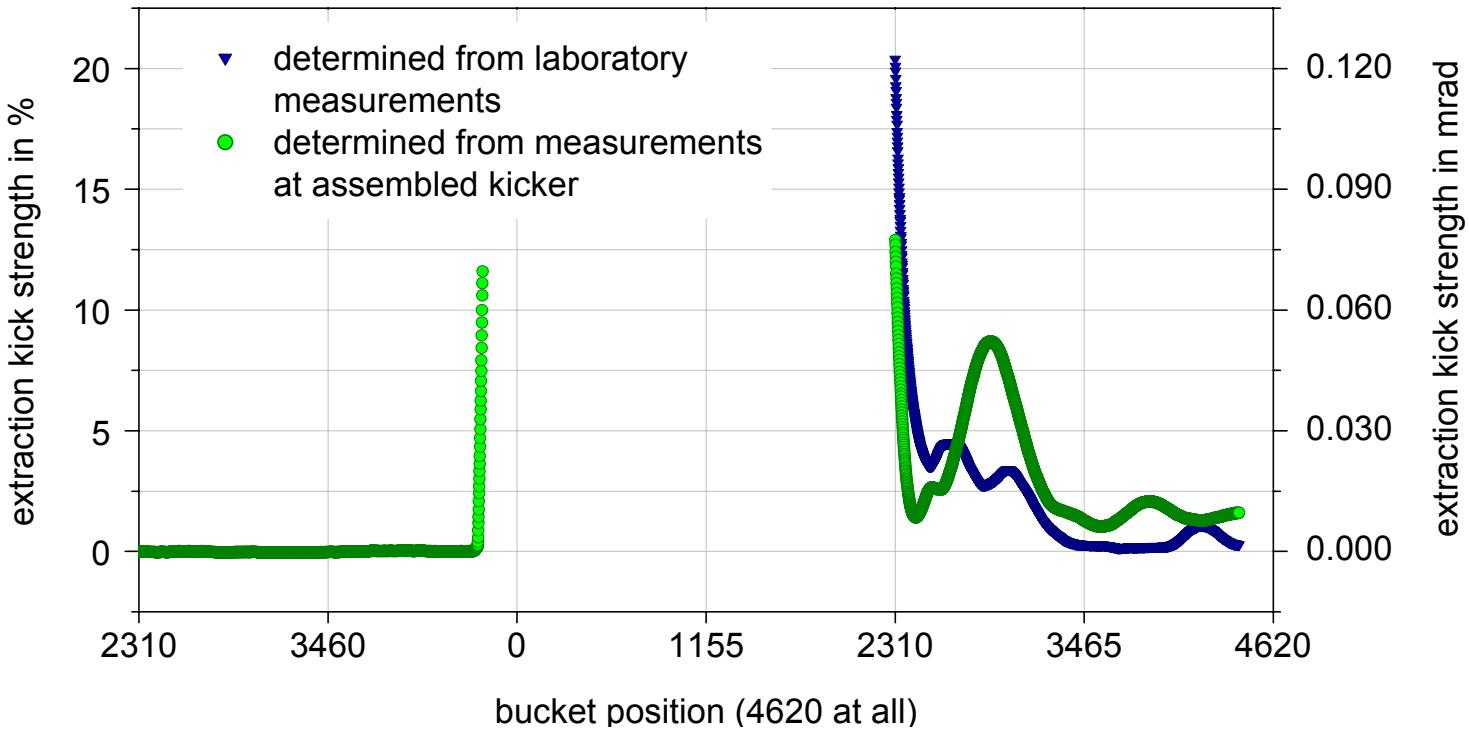
MKE kicker shape

- new Data, measured at the assembled kicker
- flanks are steeper now, but a bump appears within the second batch



Extraction kick strength

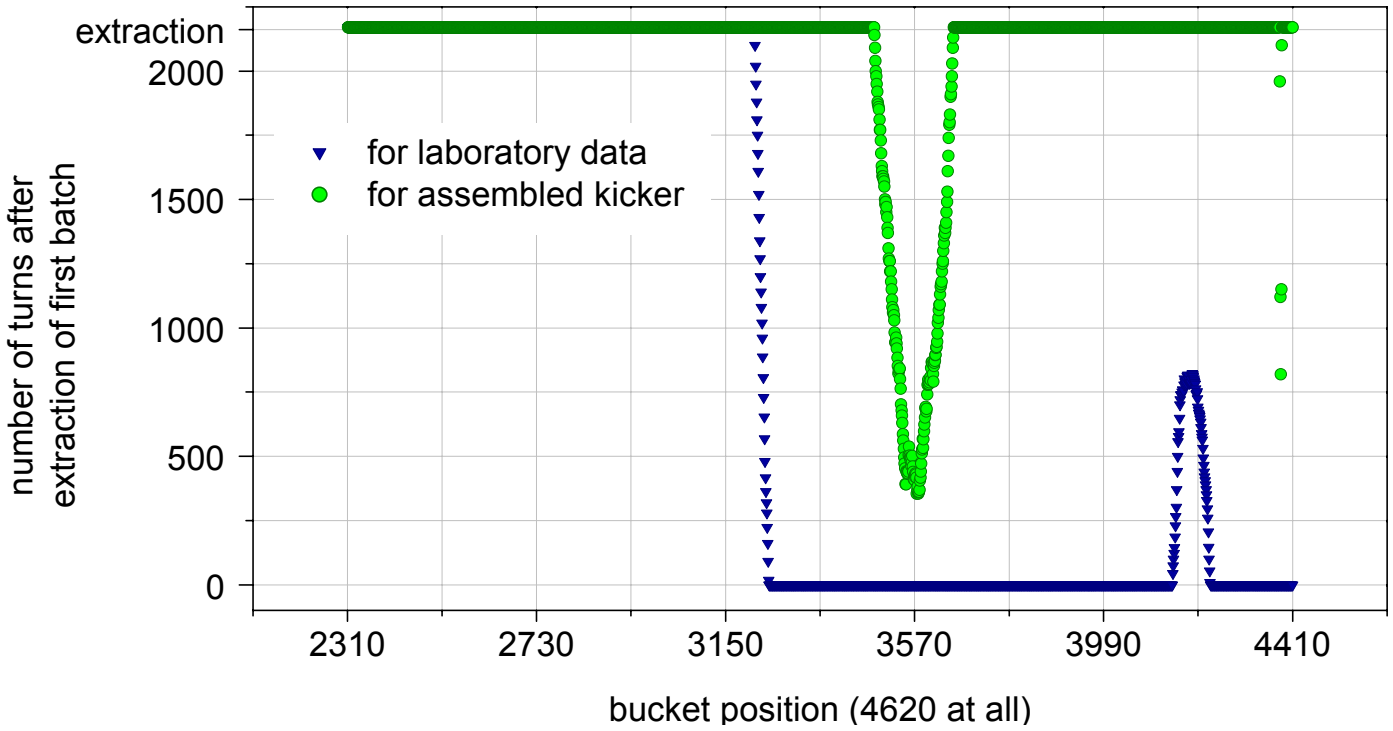
- due to steeper flanks, the kicks on the first bunches became smaller
- the bump cause stronger initial oscillations inside the batch



Absence of feedback

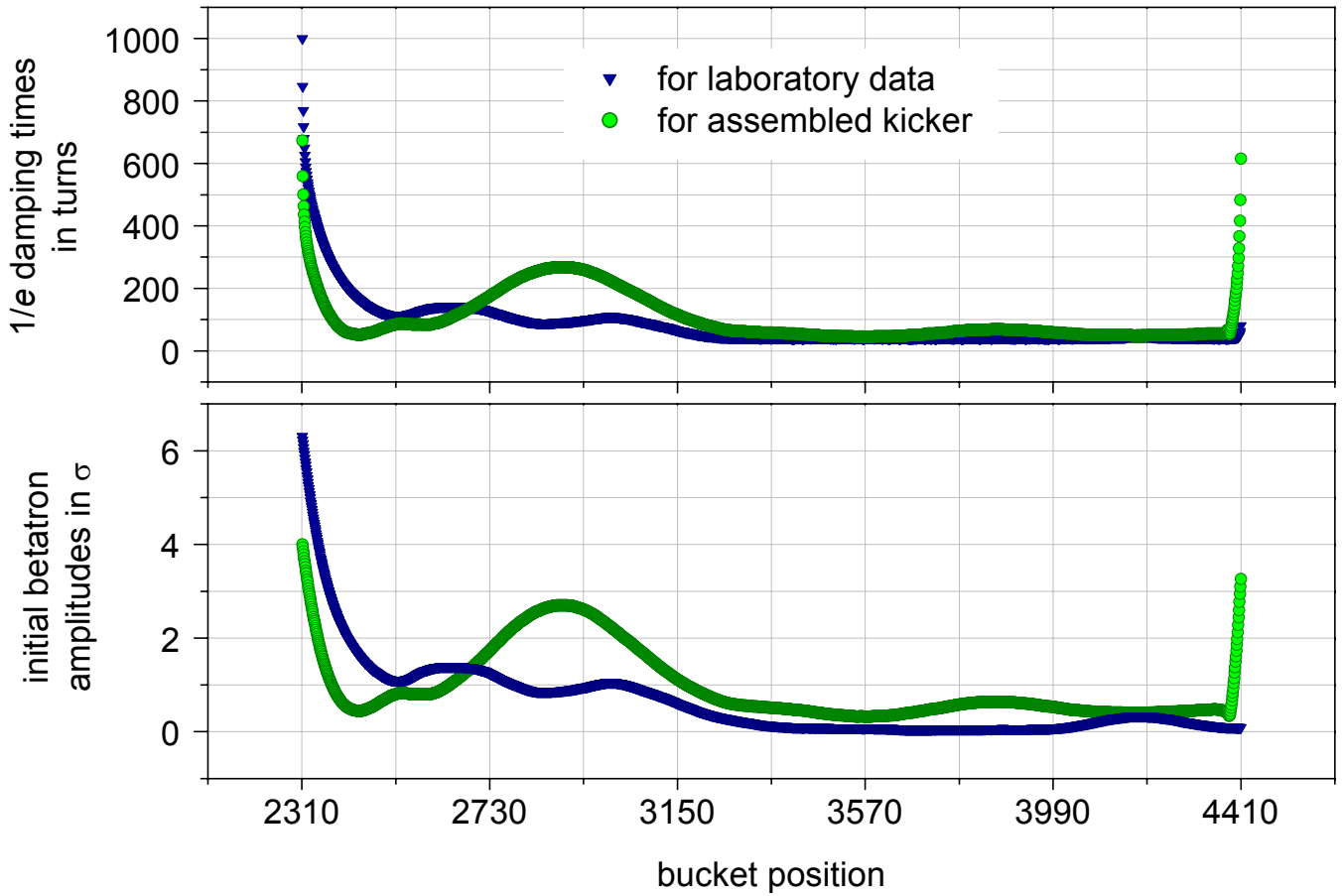
- about one halve of the batch will not hit the target properly
- the additional bump will make the situation worth – but this the other way round with feedback…

After how many turns will we fulfill the CNGS target constraints:

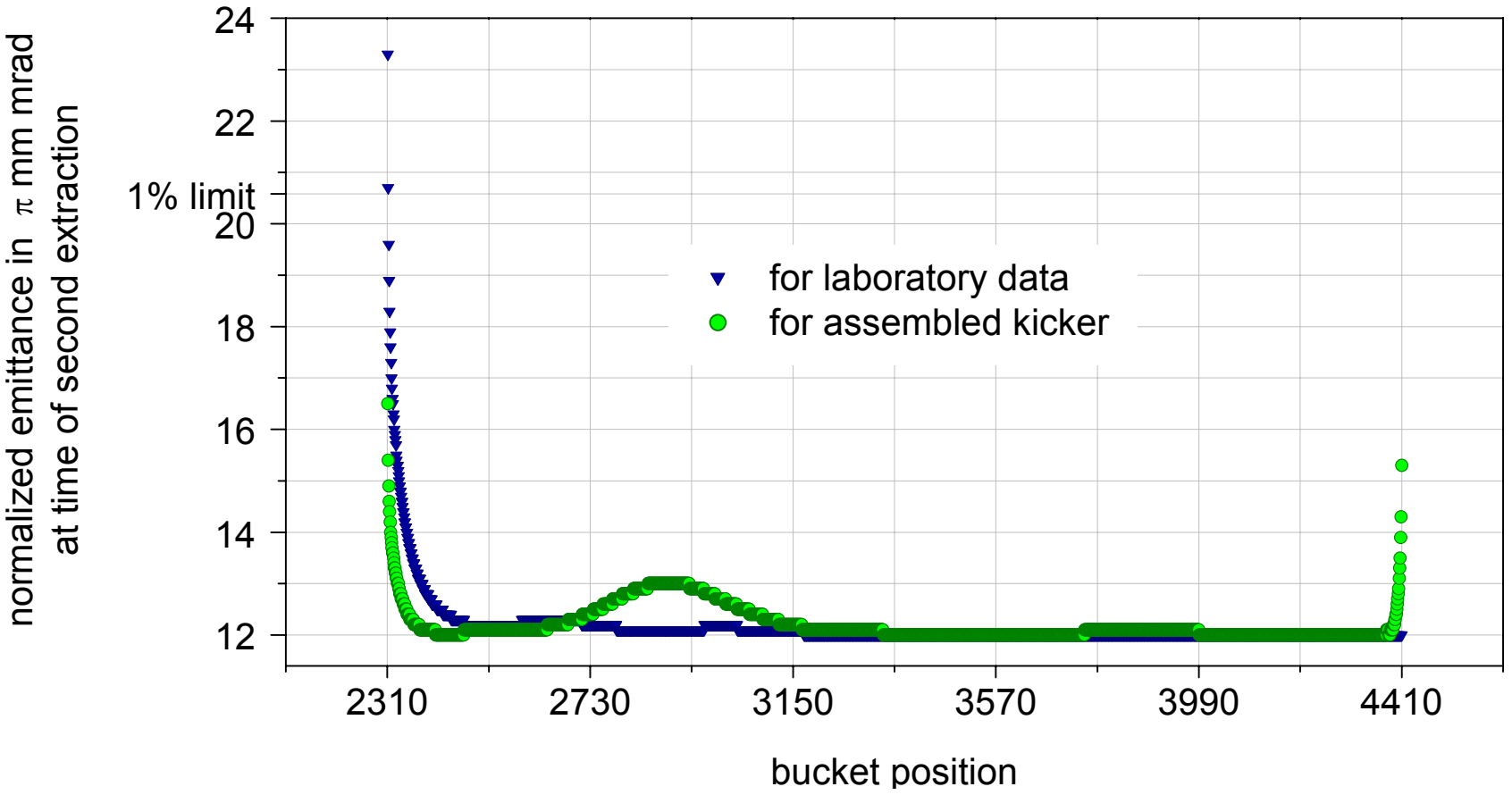


Use of feedback …

Damping times (1/e) and initial betatron amplitudes:

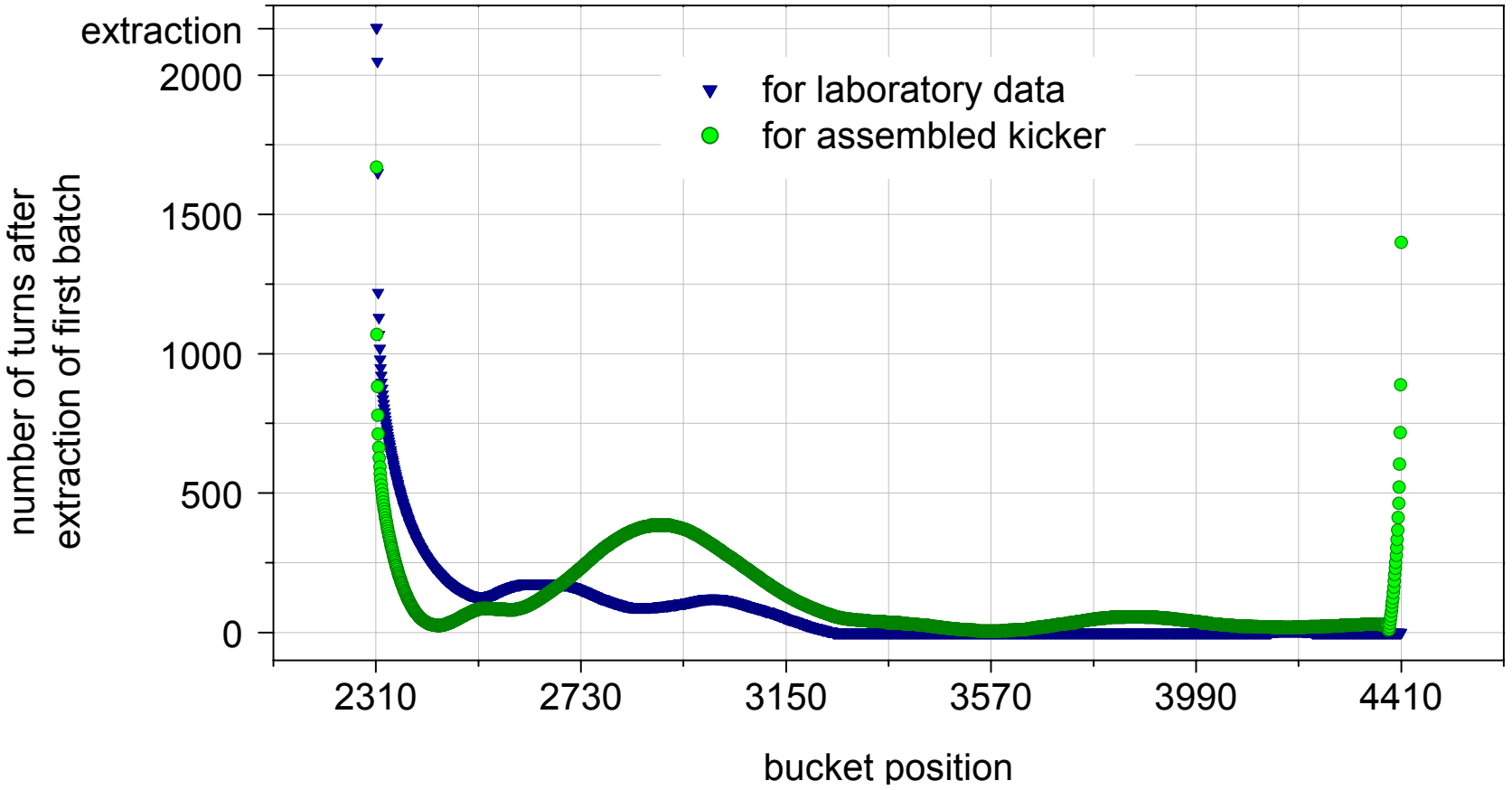


Normalized emittances



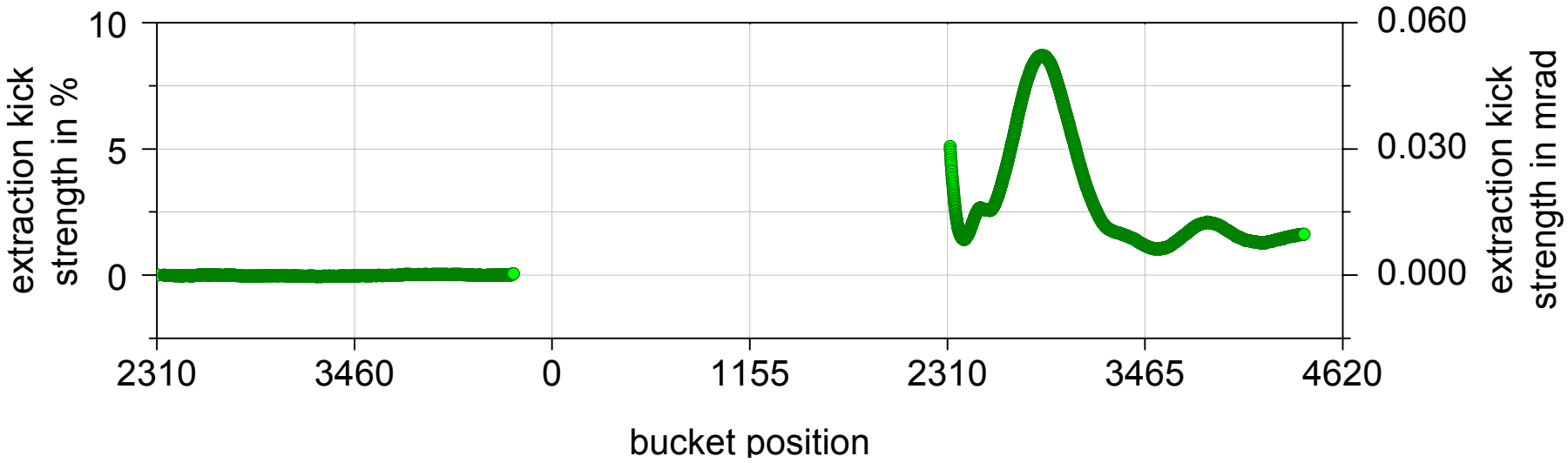
CNGS constraints fulfilled?

After how many turns will we fulfill the CNGS target constraints:



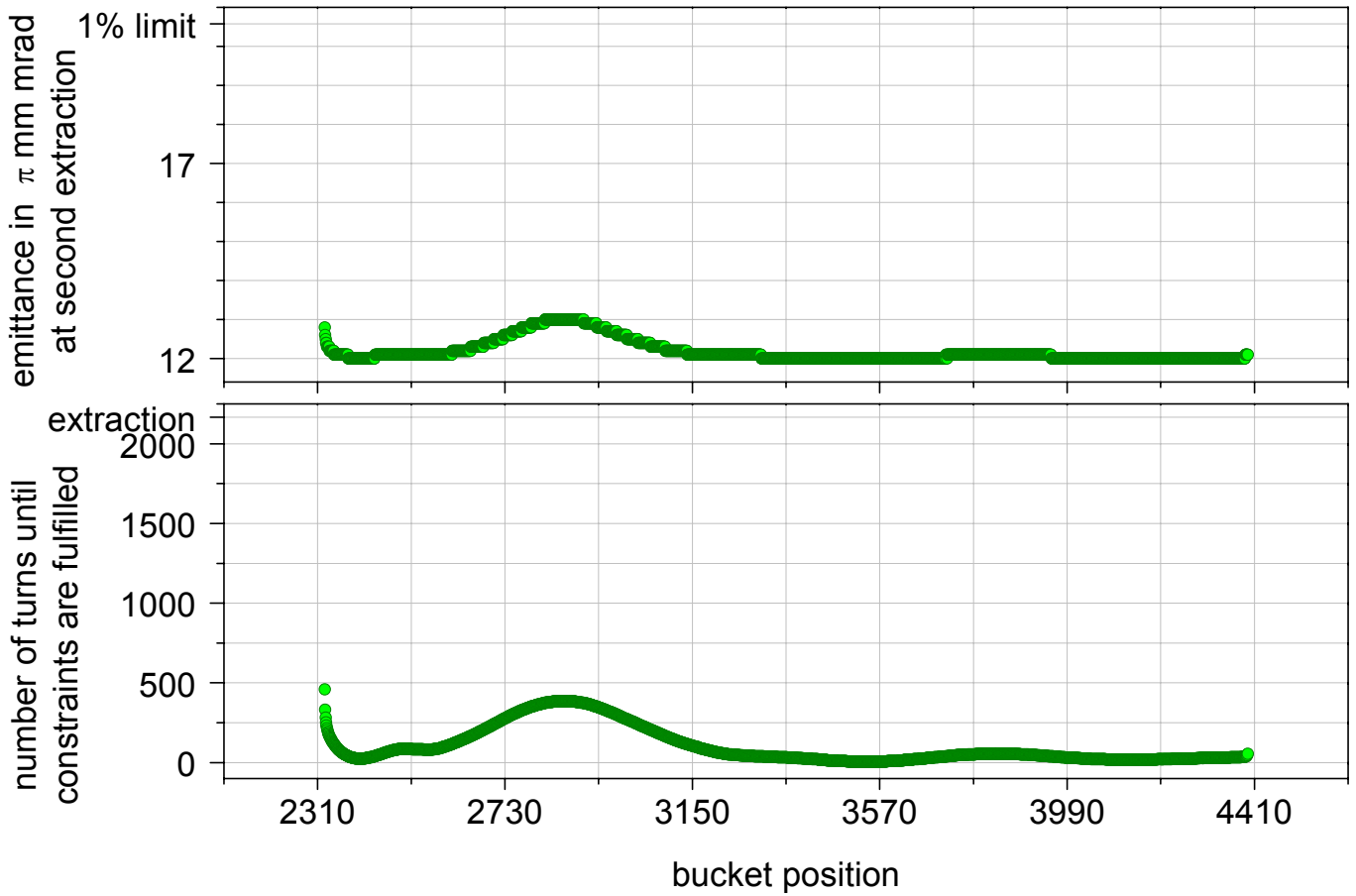
Enlarged gaps

Initial kicks in case we use batches of 2070 instead of 2100 bunches:



Results for enlarged gaps

- increase of margin from 30% to about 370%



Beam loss at septum

- laboratory data: relative loss per batch $1.6\,10^{-4}$
- assembled kicker data: relative loss per batch $1.1\,10^{-7}$
- enlarged gaps: relative loss per batch $8\,10^{-9}$